

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1-14. (Canceled)

15. (Currently Amended) An image sensing apparatus comprising:

an image sensing element that outputs a charge signal in accordance with a light amount of an object image formed on a light-receiving surface;

a light-shielding unit that shields said image sensing element from incident light;

a determination unit that determines a compensation amount for compensating a loss in exposure amount for said image sensing element caused by delay in closing of said light-shielding unit;

a setting unit that sets an exposure period of said image sensing element; and

a control unit that changes the set exposure period based on the compensation amount determined by said determination unit if the exposure period is longer than a predetermined period, and changes a gain to be applied to the charge signal based on the compensation amount determined by said determination unit if the exposure period is equal to or shorter than the predetermined period,

wherein, if the set exposure period is longer than the predetermined period and if the compensation amount determined by said determination unit is greater than a ~~predetermined~~ an upper limit of compensation amount of exposure period, ~~said determination unit determines a~~

~~second compensation amount for gain to be applied to the charge signal based on an excess of the compensation amount over the predetermined amount, and said control unit changes the exposure period based on the predetermined upper limit of compensation amount of exposure period so as to compensate a part of the loss in exposure amount for said image sensing element and changes the gain based on the second compensation amount so as to compensate the rest of the compensation amount which is not compensated after changing the exposure period loss in exposure amount for said image sensing element.~~

16. (Currently Amended) An image sensing apparatus comprising

- an image sensing element that outputs a charge signal in accordance with a light amount of an object image formed on a light-receiving surface;

- a light-shielding unit that shields said image sensing element from incident light;

- a determination unit that determines a compensation amount for compensating a loss in exposure amount for said image sensing element caused by delay in closing of said light-shielding unit;

- a setting unit that sets an exposure period of said image sensing element; and

- a control unit that changes the set exposure period based on the compensation amount determined by said determination unit if the exposure period is longer than a predetermined period, and changes a gain to be applied to the charge signal based on the compensation amount determined by said determination unit if the exposure period is equal to or shorter than the predetermined period,

wherein, if the set exposure period is equal to or shorter than the predetermined period and if the compensation amount determined by said determination unit is greater than a predetermined an upper limit of compensation amount of gain to be applied to the charge signal, said determination unit determines a second compensation amount for exposure period based on an excess of the compensation amount over the predetermined amount, and said control unit changes the gain to be applied to the charge signal based on the predetermined upper limit of compensation amount of gain so as to compensate a part of the loss in exposure amount for said image sensing element and changes the exposure period based on the second compensation amounts so as to compensate the rest of the compensation amount which is not compensated after changing the gain loss in exposure amount for said image sensing element.

17. (Currently Amended) An image sensing apparatus comprising

an image sensing element that outputs a charge signal in accordance with a light amount of an object image formed on a light-receiving surface;

a light-shielding unit that shields said image sensing element from incident light;

a determination unit that determines a compensation amount for compensating a loss in exposure amount for said image sensing element caused by delay in closing of said light-shielding unit;

a setting unit that sets an exposure period of said image sensing element;

a control unit that changes the set exposure period based on the compensation amount determined by said determination unit if the exposure period is longer than a predetermined period, and changes a gain to be applied to the charge signal based on the compensation amount

determined by said determination unit if the exposure period is equal to or shorter than the predetermined period; and

an image sensing mode setting unit that sets an image sensing mode,

wherein ~~even if the image sensing mode set by said image sensing mode setting unit is an image sensing mode of controlling exposure by keeping an exposure period set by said setting unit~~, said control unit changes the set exposure period based on the compensation amount determined by said determination unit if the exposure period is longer than a predetermined period, even if the image sensing mode set by said image sensing mode setting unit is an image sensing mode of controlling exposure by keeping an exposure period set by said setting unit.

18. (Currently Amended) A control method for an image sensing apparatus having an image sensing element that outputs a charge signal in accordance with a light amount of an object image formed on a light-receiving surface and a light-shielding unit that shields said image sensing element from incident light, said method comprising:

determining a compensation amount for compensating a loss in exposure amount for said image sensing element caused by delay in closing of said light-shielding unit;

setting an exposure period of said image sensing element;

changing the set exposure period based on the determined compensation amount if the exposure period is longer than a predetermined period, and changing a gain to be applied to the charge signal based on the determined compensation amount if the exposure period is equal to or shorter than the predetermined period,

wherein, if the set exposure period is longer than the predetermined period and if the determined compensation amount is greater than ~~a predetermined~~ an upper limit of compensation amount of exposure period, ~~a second compensation amount for gain to be applied to the charge signal based on an excess of the compensation amount over the predetermined amount is determined~~, and in said changing step, the exposure period is changed based on the predetermined upper limit of compensation amount of exposure period ~~so as to compensate a part of the loss in exposure amount for said image sensing element and the gain is changed based on the second compensation amount so as to compensate the rest of the compensation amount which is not compensated after changing the exposure period~~ loss in exposure amount for said image sensing element.

19. (Currently Amended) A control method for an image sensing apparatus having an image sensing element that outputs a charge signal in accordance with a light amount of an object image formed on a light-receiving surface and a light-shielding unit that shields said image sensing element from incident light, said method comprising:

determining a compensation amount for compensating a loss in exposure amount for said image sensing element caused by delay in closing of said light-shielding unit;

setting an exposure period of said image sensing element;

changing the set exposure period based on the determined compensation amount if the exposure period is longer than a predetermined period, and changing a gain to be applied to the charge signal based on the determined compensation amount if the exposure period is equal to or shorter than the predetermined period,

wherein, if the set exposure period is equal to or shorter than the predetermined period and if the determined compensation amount is greater than a ~~predetermined~~ an upper limit of compensation amount of gain to be applied to the change signal, ~~a second compensation amount for exposure period based on an excess of the compensation amount over the predetermined amount is determined~~, and in said changing step, the gain ~~to be applied to the charge signal~~ is changed based on the ~~predetermined~~ upper limit of compensation amount of gain so as to ~~compensate a part of the loss in exposure amount for said image sensing element~~ and the exposure period is changed ~~based on the second compensation amounts~~ so as to compensate the rest of the compensation amount which is not compensated after changing the gain ~~loss in exposure amount for said image sensing element~~.

20. (Currently Amended) A control method for an image sensing apparatus having an image sensing element that outputs a charge signal in accordance with a light amount of an object image formed on a light-receiving surface and a light-shielding unit that shields said image sensing element from incident light, said method comprising:

determining a compensation amount for compensating a loss in exposure amount for said image sensing element caused by delay in closing of said light-shielding unit;

setting an exposure period of said image sensing element;

changing the set exposure period based on the determined compensation amount if the exposure period is longer than a predetermined period, and changing a gain to be applied to the charge signal based on the determined compensation amount if the exposure period is equal to or shorter than the predetermined period; and

setting an image sensing mode,

wherein ~~even if the set image sensing mode is an image sensing mode of controlling exposure by keeping a set exposure period~~, the set exposure period is changed based on the determined compensation amount if the exposure period is longer than a predetermined period, even if the set image sensing mode is an image sensing mode of controlling exposure by keeping a set exposure period.

REMARKS

Claims 15-20 have been amended.

Claims 15-20 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art ("AAPA") (U.S. Patent Publication No. 2004/0119835) in view of Shibuya et al. ("Shibuya") (U.S. Patent No. 5,896,705). With respect to Applicant's claims, as amended, these rejections are respectfully traversed.

Applicant's claim 15 has been amended to better define Applicant's invention. More particularly, amended claim 15 recites an image sensing apparatus comprising: an image sensing element that outputs a charge signal in accordance with a light amount of an object image formed on a light-receiving surface; a light-shielding unit that shields said image sensing element from incident light; a determination unit that determines a compensation amount for compensating a loss in exposure amount for said image sensing element caused by delay in closing of said light-shielding unit; a setting unit that sets an exposure period of said image sensing element; and a control unit that changes the set exposure period based on the compensation amount determined by said determination unit if the exposure period is longer than a predetermined period, and changes a gain to be applied to the charge signal based on the compensation amount determined by said determination unit if the exposure period is equal to or shorter than the predetermined period, wherein, if the set exposure period is longer than the predetermined period and if the compensation amount determined by said determination unit is greater than an upper limit of compensation amount of exposure period, said control unit changes the exposure period based on the upper limit of compensation amount of exposure period and changes the gain so as to compensate the rest of the compensation amount which is